What is claimed is:

- 1 1. A nonlinear optical chromophore having the formula D- π -A, wherein: π is a π bridge
- 2 including a thiophene ring having oxygen atoms bonded directly to the 3 and 4 positions of
- 3 the thiophene ring; D is a donor; A is an acceptor; and the oxygen atoms are further
- 4 substituted with a fluorinated group comprising at least three fluorines.
- 1 2. The nonlinear optical chromophore of Claim 1, wherein π comprises:

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- wherein independently at each occurrence R^f is a fluorinated group comprising at least three fluorines.
- 1 3. The nonlinear optical chromophore of Claim 2, wherein π comprises:

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wherein independently at each occurrence R^f is a fluorinated group comprising at least three fluorine atoms.

1 4. The nonlinear optical chromophore of Claim 1 wherein the donor is selected from the group

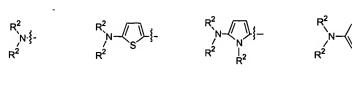
2 consisting of:

3 4

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$$(R^{1}_{2}C)_{m}$$

and the acceptor is selected from the group consisting of

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- wherein independently at each occurrence: R¹ is hydrogen, a halogen except when
 bonded to a carbon alpha to or directly to a nitrogen, oxygen, or sulfur atom, or an alkyl,
 aryl, heteroalkyl, or heteroaryl group; R² is hydrogen or an alkyl, aryl, heteroalkyl, or
 heteroaryl group; Y is O, S or Se; m is 2, 3 or 4; p is 0, 1 or 2; and q is 0 or 1.
 - 5. The chromophore of Claim 4, wherein the donor is selected from the group consisting of

$$\begin{array}{c}
R^1 \\
R^2 \\
R^2
\end{array}$$

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- wherein, independently at each occurrence: R¹ is hydrogen, a halogen except when bonded to a carbon alpha to or directly to a nitrogen, oxygen, or sulfur atom, or an alkyl, aryl, heteroalkyl, or heteroaryl group; and R² is hydrogen or an alkyl, aryl, heteroalkyl, or heteroaryl group.
- 1 6. The chromophore of Claim 1 wherein the fluorinated group is selected from the group
- consisting of 2,2,2-trifluoroethyl; 2,2,3,3,3-pentafluoropropyl; 2,2,3,3,4,4,4-heptafluorobutyl;
- 3 2,2,3,3,4,4,5,5,5-octafluoropentyl; 3,3,4,4,-5,5,6,6,7,7,8,8,8-tridecafluoro-1-octyl;
- 4 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluorooctyl; 1-trifluoromethyl-2,2,2-trifluoroethyl; 1-
- 5 trifluoromethyl-2,2,3,3,3-pentafluoropropyl; 2,3,4,5,6-pentafluorobenzyl; and (2,3,4,5,6-
- 6 pentafluorophenyl)ethyl.
- 7. The chromophore of Claim 1, wherein the fluorinated group has the formula –(CH₂)_t(CF₂)_vF
- 2 or $-(CH_2)_t(CF_2)_wH$, where t = 1 to 5, v = 1 to 20, and W = 2 to 20.
- 1 8. A second order nonlinear optical composition comprising a polymer matrix and the
- 2 chromophore of Claim 1.
- 1 9. The composition of Claim 8, wherein the polymer matrix is crosslinked.
- 1 10. The composition of Claim 8, wherein the chromophore is covalently incorporated into the polymer matrix.

- 1 11. The composition of Claim 10, wherein the polymer matrix is crosslinked.
- 1 12. The composition of Claim 8, wherein the polymer matrix is fluorinated.
- 1 13. An electro-optic device, comprising the second order nonlinear optical composition of Claim
- 2 8.
- 1 14. The electro-optic device of Claim 13, wherein the electro-optic device is selected from the
- 2 group consisting of an optical modulator, an optical switch, and an optical directional
- 3 coupler.
- 1 15. The electro-optic device of Claim 13, comprising: 1) an input waveguide; 2) an output
- 2 waveguide; 3) a first leg having a first end and a second end, the first leg being coupled to the
- 3 input waveguide at the first end and to the output waveguide at the second end; and 4) and a
- 4 second leg having a first end and a second end, the second leg being coupled to the input
- 5 waveguide at the first end and to the output waveguide at the second end.
- 1 16. The electro-optic device of Claim 13, comprising: 1) an input; 2) an output; 3) a first
- 2 waveguide extending between the input and output; and 4) a second waveguide aligned to the
- first waveguide and positioned for evanescent coupling to the first waveguide.
- 1 17. An optical router including the electro-optic device of Claim 13.
- 1 18. A communications system including at least one electro-optic device of Claim 13.
- 1 19. A method of data transmission comprising transmitting light through the composition of
- 2 Claim 8.
- 1 20. A method of telecommunication comprising transmitting light through the composition of
- 2 Claim 8.
- 1 21. A method of transmitting light comprising directing light through or via the composition of
- Claim 8.

- 1 22. A method of routing light through an optical system comprising transmitting light through or
- 2 via the composition of Claim 8.
- 1 23. A phased array radar system comprising the composition of Claim 8.